

## **Chapter 2**

### **ALTERNATIVES INCLUDING THE PROPOSED ACTION**

#### **2.0 INTRODUCTION**

This Chapter describes the alternatives developed to address the issues, presents a comparison of the alternatives and a summary of the effects resulting from implementing each alternative. Section 2.2 presents these alternatives in detail.

#### **2.1 DEVELOPMENT OF ALTERNATIVES**

Alternatives present different management options in response to the purpose and need for the Proposed Action and address the relevant issues related to the Proposed Action. The effects analysis (Chapter 4) then describes the known or potential effects that would result if the alternatives were implemented.

*Alternative A* is the No Action Alternative. In this alternative, no approvals would be issued for the PODs. The existing situation would continue (producing fee and state wells in the project area) and no federal wells or associated infrastructure would be constructed. The Federal portion of the PODs proposed by Fidelity would be denied in their entirety and the landscape would not be further altered.

*Alternative B* is Fidelity Exploration and Production Company submitted Proposed Action. This alternative would analyze the complete implementation of Fidelity's Deer Creek North PODs proposal including:

- construction, drilling, production, and reclamation of federal CBNG wells
- use of existing compression and sales facilities
- CBNG produced water management using existing MPDES Permits for treated and untreated water discharge and beneficial uses

*Alternative C* would analyze the implementation of Fidelity's Deer Creek North PODs proposal as submitted, while applying mitigating measures, not already part of the operator's proposal, as part of this alternative. The incorporation of mitigating measures identified during project review would avoid or reduce impacts to cultural, social and natural resources. Based on public comment and issues, Alternative C is the agencies' preferred alternative.

##### **2.1.1 Alternatives considered but eliminated from Detailed Analysis**

###### **Multiple Produced Water Management Options**

In this suggested alternative, produced CBNG water would be managed using means other than those proposed by Fidelity. Potential water management methods include, but are not limited to, injection, infiltration impoundments, evaporation ponds, land application, and irrigation. Any produced water management plans and permits would need to be approved by BLM or the appropriate agency in consultation with affected surface owners. This alternative was eliminated from detailed analysis because the projected volumes of produced water from the project can be managed using existing MPDES Permits for discharge of treated and untreated water and used for beneficial purposes, such as livestock water, and industrial purposes, as proposed by Fidelity. The analysis in this EA shows no unresolved conflicts resulting from the proposed water management approach. Therefore, analysis of multiple produced water management alternatives is not necessary to address impacts to water resources.

#### **2.2 DESCRIPTION OF THE ALTERNATIVES**

A comparison of the major components for the three alternatives is found in Table 2.5-1. A detailed description of each alternative follows.

##### **2.2.1 Alternative A—No Action**

There would be no BLM approved Deer Creek North and Deer Creek North Amendment PODs actions. None of the federal wells and associated infrastructure, in the PODs, would be constructed, drilled, completed, produced and reclaimed. This alternative would not affect the existing situation, producing fee

and state wells and existing infrastructure. The entire federal portion of the Fidelity Deer Creek North PODs project area would be denied.

### **2.2.2 Alternative B—Fidelity’s Proposed Action; Deer Creek North and Deer Creek Amendment PODs, Federal Well & Infrastructure Development and Existing Water Management Options**

Fidelity’s proposed Deer Creek North and Deer Creek North Amendment PODs include Master Drilling and Surface Use Plans, Water Management Plans, Cultural Resource Inventory Plans, Wildlife Monitoring and Protection Plans, Noxious Weed Management Plans, and other supporting information. Each POD describes the project and best management practices designed to implement the project.

The analysis of the Deer Creek North project area, within Alternative B, includes the development and production of federal wells and infrastructure (34 federal wells, see Appendix A). Map 1.3-2 shows the Deer Creek North project boundary, existing and proposed well locations, access roads, pipelines for water and gas, overhead and underground power lines, produced water management options, and metering/compressor facilities.

Fidelity’s Proposed Action; Deer Creek North and Deer Creek North Amendment PODs wells & infrastructure, existing sales and compression, and existing water management options include: BLM would approve the drilling, completing, production and reclamation of 34 federal wells. BLM would approve constructing associated infrastructure of access roads, flowlines, power lines, reclaiming disturbed areas, produced water management and the use of meter and compressor facilities. These 34 wells would be drilled and completed in the Dietz, Monarch, Carney and Wall coal zones. The average production life of the project wells is expected to be 10-20 years with final reclamation to be completed 2 to 3 years after plugging of the wells. Components of the proposed projects are listed in Chapter 2, Table 2.5-1.

#### Agreements

Fidelity Exploration and Production Company certifies that they have obtained Surface Damage Agreements from all parties directly affected by the Deer Creek North project. This includes the surface estate owners whose land operations will take place.

Fidelity Exploration and Production Company certifies that they have obtained Water Well Mitigation Agreements from all parties directly affected by the Deer Creek North project. This includes owners of all wells or springs within one mile of Fidelity’s proposed operations. These agreements also include measure to remedy methane-related impacts and baseline and periodic monitoring.

#### Drilling

Thirty-four CBNG federal wells would be drilled on 34 well sites (see Appendix A), with an approximate well density in the project area of two wells per 160 acres (2 wells, multiple coal seam completion, per 160 acres). A single vertical well would be drilled into the Wall, Carney, Monarch and Dietz coal seams. Anticipated depth of the wells would be from approximately 500 to 1,300 feet deep. The drilling and construction period is anticipated to begin Fall 2008.

A commingled well (monobore) is designed and completed to produce gas and water from two or more coal beds from a single well bore. Each well would be drilled by truck-mounted water well rigs using air and/or water, supplemented as needed by bentonite, polymer, and cedar fiber, and then drilled 40 to 50 feet below the bottom of the deepest target coal bed with steel casing cemented in place from the ground surface to total depth. Casing would be sized to accommodate a downhole pump capable to lift water at that depth and would typically be 7 inch in diameter. A cement bond log would be run to confirm proper cementing of the casing and to identify depth intervals of each potentially producing coal zone. The casing would then be perforated in each of the potentially producing coal zones. An acid/water solution would be pumped into the casing to break down residual drilling muds and cement in each perforated coal zone. Hydraulic stimulation would then be performed to further break down drilling muds and other fine-grained materials in the well bore. CBNG produced water would be trucked to drilling locations and between 8,000 and 16,000 gallons would be needed per well to support these completion activities. A production pump would be installed in the well, typically just above the lower producing coal, and initial production

pumping would begin. CBNG production would occur by pumping groundwater from the coal seams, thereby reducing hydrostatic pressure and causing the methane to become desorbed from the coal surface and flow to the wells. All wells capable of commercial production would be completed and produced and the associated infrastructure would be constructed and installed.

Drilling wastes including cuttings, water, native mud, and bentonite would be placed in the mud pit. Upon successful completion, the well would be shut-in pending installation of new gas gathering and processing facilities. The drilling rig would be released from the location and removed. The mud pit would be closed and reclaimed. Fluids, muds, and synthetic liners would be removed and properly disposed of within 90 days of completion of drilling. Residual fluids and muds would be allowed to dry before backfilling the pit and recontouring the ground surface. The pit would not be cut or trenched. The backfilled pit would be covered with a minimum of three feet of soil. Closed and reclaimed pits would be inspected periodically to determine if significant subsidence has occurred. If subsidence is noted, additional backfilling and recontouring would be performed.

#### Access

Vehicles would access the well sites by existing improved roads, two track trails or across undisturbed rangeland along a designated route. Access to federal wells would use approximately 4.5 miles of existing two track road (all private surface), 11.3 miles of proposed two track road (.4 miles federal surface and 10.9 miles private surface), 4.5 miles of existing improved road (all private surface) and less than .1 mile of proposed spot upgrade road (all private surface). Pipeline corridors would also be used as temporary roads for access to well sites. There would be one low-water crossing needed on a spot upgrade section of road to access the 31-1291 location, T. 9 S., R. 41 E., N $\frac{1}{2}$ SW $\frac{1}{4}$  Section 1. Additional culverts or low water crossings would be installed at ephemeral drainage crossings, if needed. Gravel or scoria needed for surfacing material would come from a pit owned and operated by Fidelity and permitted by Montana and Wyoming DEQ's.

The road and pipeline routes for the Deer Creek North project area are proposed as agreed to by the appropriate private surface owner or surface management agency (State/BLM). Location, design and construction of all new roads would be in accordance with the BLM Manual Section 9113 concerning road construction standards on projects subject to federal jurisdiction. Where possible, roads would serve as a common corridor for the gas, electric, and water. The project map (1.3-2) shows the project boundary, existing and proposed wells, access roads, pipelines (water and gas), power lines, and the central gathering/metering/water processing facilities in the project area. An approximately a 30 foot wide corridor of disturbance would be expected along the combined access, gas and water lines. An approximately 16 foot wide corridor of disturbance would be expected along the "access only" routes. These corridors would be disturbed by construction activities, and would be expected to be reclaimed within 1 year after a specific activity has been completed. The improved access routes would be reclaimed 2 to 3 years following the end of gas production.

Dust control measures would be applied on unpaved roads to minimize fugitive dust during construction and operations. Following well completion and production facility installation, travel to wells would normally be limited to one or two visits weekly. A light truck or utility vehicle would be used to check operations, read meters and provide infrastructure service. Service trips would be rescheduled during periods of wet weather that could cause damage to access routes. Routine road maintenance would occur on a year-round basis or as ground and site conditions permit. Existing roads would be maintained in the same or better condition as existed prior to the start of operations.

#### Well Sites

The 34 federal CBNG wells would be located at 34 sites, with one well drilled at each site. The 34 federal well sites would be split, with 31 locations on private surface/federal mineral and 3 locations on BLM administered surface/federal mineral lease. Approximately one-third of an acre at each well site would be disturbed by vehicle traffic, drilling and completion operations, reserve pits and temporary storage of equipment. The well sites would not require construction of a well pad; however, blading may be needed to provide a level surface for the drill rig.

The Deer Creek North project area surface facilities would consist of a wellhead and an insulated, fiberglass well head cover (approximately 5 feet square by 4 feet tall) and an electrical panel all enclosed in a three rail, welded fence (approximately 16 feet x 12 feet). The fenced area would be graveled while the area outside the fence would be reclaimed after installation of production equipment. Well production data would be collected from instrumentation located in a meter house near each well (approximately 6 feet x 12 feet x 6 feet). The well and meter houses would be painted a color to blend with the surrounding area. Following this reclamation, approximately ¼ acre or less per well site will remain disturbed during the production phase of the wells. Final reclamation would be 2 to 3 years following the end of gas production.

#### Power Lines

Overhead electricity would be brought into the project area by approximately 13 miles of existing lines along the Otter Creek Road and those constructed for the Deer Creek North POD private and state development. These lines would generally be located along access roads or on ROWs across open land. Approximately 1.3 miles of overhead line and 5 power drops are proposed for the project, all located on private surface mostly outside common corridors. Electrical junction boxes would be installed where needed by the electric utility company and would be painted to blend with the surrounding environment.

Buried electrical lines would tie into the aerial power lines at a service tap or drop which typically would serve three well sites. Buried power lines would be installed parallel to access roads, in the common corridor, or follow the most direct route from a power pole to the well site. There would be approximately 11.1 miles of proposed buried electrical line (.4 miles federal surface; 10.7 miles private surface) for this project, with all located in the common corridor.

An approximate 10 foot wide corridor of disturbance would be expected along both the overhead and buried power lines. These corridors would be disturbed by construction activities, and would be expected to be reclaimed within 1 year after a specific activity has been completed. Final reclamation would be 2 to 3 years following the end of gas production.

#### Flowlines

A 4 inch plastic flowline to carry gas would be buried from each well to a battery/compressor site. One 4 inch plastic flowline would be buried, carrying produced water from all wells to the central collection point or surface discharge point. When feasible, flowline routes would run parallel and be located adjacent to existing or proposed roads and trails accessing the battery or water storage/discharge point. Approximately 11.1 miles (0.4 miles federal surface, 10.7 miles private surface) of these combined flowlines would be installed in the common corridor. No water or gas lines would be located outside the common corridor.

All 8 to 12 inch steel gas pipelines required to carry gas from each compressor site to the Symons Central Compressor Station have previously been installed by the Deer Creek North PODs private and state development.

A 30 foot wide corridor of disturbance would be expected along the combined gas and water lines and the steel gas pipe line routes. A 10 foot wide corridor of disturbance would be expected along the water or gas only routes. These corridors would be disturbed by construction activities, and would be expected to be reclaimed within one year after a specific activity has been completed. Final reclamation would be 2 to 3 years following the end of gas production.

#### Produced Water Management

CBNG produced water would be transported through buried plastic flowlines from each well site to the following water management options: (1) beneficially used for industrial uses (dust suppression) in the Spring Creek and Decker Coal Mines; (2) beneficially used by Fidelity for CBNG drilling, construction and dust suppression; (3) beneficially used by livestock and wildlife; (4) treated via ion exchange and discharged to the Tongue River using Fidelity's existing MDEQ discharge permit for treated water (MT0030724); and (5) discharged to the Tongue River using Fidelity's existing MDEQ direct discharge permit (MT0030457).

Beneficial use by the mines (1) is estimated to consume 205 to 455 gpm of water depending on the season. Next, treated discharge (4) would occur at a rate of 1,430 gpm. The use of treated discharges also requires the use of lined impoundments 34E-3490 and 12-3490 for incidental storage and bypass for treatment, plant maintenance, and final water preparation prior to discharge. Finally, the direct discharge permit (MT0030457) (5) would be used to manage the remainder of the water, ensuring that the volume discharged is less than the permitted limits of 2,500 gpm from November through February, 2,375 gpm from March through June, and 1,600 gpm from July through October.

Beneficial use by Fidelity for drilling, construction and dust suppression (2) and the watering of livestock and wildlife (3) would occur; however this usage is not included in the water balance forecast.

The watering of livestock and wildlife (3) would include the use of existing and new installation of large tire stockwater tanks, estimated to hold 800-900 gallons each. The Deer Creek North project area has 17 existing and 8 proposed tire stock tanks; 24 located on private surface and one proposed on BLM administered surface. Each tire stock tank would be equipped with a "float" to regulate the water flow into each tank and prevent overflow.

The Deer Creek North discharge points into the Tongue River are located in or near the main channel. There are two types of outfalls associated with this project. Under the direct discharge permit most outfall structures (001, 002, 003, 005, 007, 009, 010, 011, 012, 013, and 014) consist of a riprap pad surrounding the discharge pipe with a narrow riprap lined trench sloping into the channel area to prevent eroding the channel bank. Four outfalls under the direct discharge permit (004, 006, 008, and 016) have been modified to include instream diffusers that extend the width of the streambed under low flow conditions, allowing these discharges to meet the definition of instantaneous mixing at the point of discharge. The treatment permit discharges from one location, which is the same location that had been designated as 015 for the direct permit. This treated discharge is also via a diffuser.

Under the terms of MPDES permit MT0030457 a maximum of 1,600 gpm of untreated water can be discharged to the Tongue River from July-October; 2,500 gpm can be discharged from November to February, and 2,375 gpm can be discharged from March to June. The water balance for this alternative indicates that the maximum rate of untreated discharge will be 967 gpm during February of 2009. All discharges would comply with the requirements of the MPDES permit developed by the MDEQ.

Under the terms of MPDES permit MT0030724, a maximum of 1,700 gpm of treated water can be discharged to the Tongue River. From November 1 through March 1 the average monthly SAR and EC of the discharged water needs to be less than 5.0 and 1,500  $\mu\text{S}/\text{cm}$  respectively. From March 2 through October 31 the average monthly SAR and EC of the discharged water needs to be less than 3.0 and 1,000  $\mu\text{S}/\text{cm}$  respectively. There are also conditions in the permit which limit the levels of suspended solids and total nitrogen by season. The water balance indicates that this facility is anticipated to operate at 1,430 gpm at least through 2010, leaving 270 gpm of capacity under the MPDES permit to be used if needed.

The treatment facility is located 2.5 miles south-southeast of Decker Montana, Big Horn County; T. 9. S, R. 40 E., SE $\frac{1}{4}$ SE $\frac{1}{4}$ , Section 34. The facility covers an area of approximately 280 feet x 360 feet (2.2 acres), and is located on the south side of Badger Creek. Fidelity is using an ion exchange system for water treatment. This treatment system replaces positively charged cations in the CBNG produced water (e.g. sodium, calcium and magnesium) with hydrogen ions obtained from hydrochloric acid (HCl). The addition of these hydrogen ions causes the treated water to have a low pH. This low pH is managed by post-treatment air stripping and/or the addition of a lime solution, gypsum bed, or other suitable base to reduce the acidity. Lime and gypsum also serve as a source of calcium which decreases SAR. This process typically removes 95% or more of the total salts from the water. Following treatment the water is held in lined pond 12-3490 so that the water can equilibrate with the atmosphere which allows pH to stabilize and precipitates to form prior to discharge to the Tongue River. In accordance with the MPDES permit, treated water may be blended with untreated water prior to discharge so long as the water quality requirements of the MPDES permit are met, and the untreated water does not exceed 23% of the total from November 1

through March 1 or 14% of the total from March 2 through October 31. All discharges would comply with the requirements of the MPDES permit developed by the MDEQ.

This treatment process causes a concentrated low pH sodium-chloride brine to be generated. This brine is currently being transported by Kissack Water and Oil Services, Inc. and is injected into Kissack's Kuehne injection well which is operated under UIC permit #01109, and Kissack's Hamm #1 injection well which is operated under UIC permit #01036. Both of these wells are permitted as Class I injection wells. In the future, the brine could also be further concentrated on site, crystallized to a solid, and either closed in place on-site or transported and disposed of at a permitted non-hazardous waste landfill.

Fidelity has also constructed an off-channel impoundment, 34E-3490, in association with the treatment plant. Reservoir 34E-3490 is located in a natural depression. The impoundment, located in T. 9 S., R. 40 E., SE $\frac{1}{4}$ SW $\frac{1}{4}$ , Section 34, is used for backup storage when treatment system interruptions occur. This impoundment provides for 13 acre-feet of storage. Both 12-3490 and 34-3490 have been approved by MBOGC, and are lined with a 20-mil polyethylene liner with an 8-ounce geotextile underlayment. Twelve inch anchor trenches are used to secure the liners. Monitoring of these impoundments is conducted in accordance with the requirements identified by MDEQ in MPDES permit MT0030724. These monitoring plans were developed to "ensure the natural quality of the ground water is not impaired by the infiltration of the CBNG produced water" (MPDES permit MT0030724, page 16).

#### Battery/Compressor Sites

Gas from the Deer Creek North wells would be transported from each well head to existing field battery/compressor sites. The batteries/compressor sites include the Deer Creek Central – Holmes 14 Complex (MAQP #3383, formerly named Deer Creek North – Rancholme 14 Complex), Montana Royalty #3 Battery (MAQP #3386), Holmes 2 Battery (MAQP #3388, formerly named Rancholme #2 Battery), Decker #6 Battery (MAQP #3389), and the existing sales battery, Symons Central Compressor Station (MAQP #3250).

Each battery would serve about 40 to 75 wells. Approximately two acres at each site has been disturbed by vehicle traffic, production operations, and temporary storage of equipment; enclosed by a barbed wire fence. One or two meter houses and up to four compressors are located at each battery. Meter houses and compressor buildings are painted to blend in with the surrounding area, and access roads to batteries and central facilities are surfaced with gravel. Final reclamation would be completed 2 to 3 years following the end of gas production.

#### Reclamation

Surface disturbances would be reclaimed according to the surface use agreements, BLM requirements, and MDEQ storm water construction permits and storm water pollution prevention plans. Reclamation would occur in areas where surface disturbing activities have been completed or concurrent with other operations in the project area. Typically, disturbed areas not needed for production operations or during final reclamation, would include: removal of facilities, cleaning and abandonment of pipe and power lines, re-contoured to resemble the surrounding terrain, stored topsoil spread over the re-contoured area, necessary erosion control measures installed, disturbed areas seeded with certified weed-seed free mix, agreed upon with the surface owner and completed within one year after a specific activity has been completed. Seeding typically would occur in the fall of each year, after September 15. However, if spring seeding is selected, it will be completed by May 15. Soil fertility evaluations would be conducted and soil amendments added to assist in timely germination and re-establishment of vegetation, as needed. Finally, casing would be cut off 4 feet below ground surface with a metal plate affixed to the top providing operator's name, well number, location, and federal lease number. Final reclamation would be completed approximately 2 to 3 years following the end of gas production.

A detailed description of design features, construction practices, water management strategies and reclamation measures associated with Alternative B, can be found in the Master Surface Use Plan, Drilling Plan and Water Management Plan in the Deer Creek North and Deer Creek North Amendment PODs and their individual APDs.

### **2.2.3 Alternative C—Fidelity’s Proposed Action; Deer Creek North and Deer Creek Amendment PODs, Federal Well & Infrastructure Development and Existing Water Management Options, with Additional Mitigation: *Agency’s Preferred Alternative***

The analysis of the Deer Creek North project area, within Alternative C, includes the development and production of federal wells and infrastructure (34 federal wells, see Appendix A). Map 1.3-2 shows the Deer Creek North project boundary, existing and proposed well locations, access roads, pipelines for water and gas, overhead and underground power lines, produced water management options, and metering/compressor facilities.

Fidelity’s Proposed Action; Deer Creek North and Deer Creek North Amendment PODs wells & infrastructure, existing sales and compression, and existing water management options, with additional mitigation include: BLM would approve the drilling, completing, production and reclamation of 34 federal wells. BLM would approve constructing associated infrastructure of access roads, flowlines, power lines, reclaiming disturbed areas, produced water management and the use of meter and compressor facilities. These 34 wells would be drilled and completed in the Dietz, Monarch, Carney and Wall coal zones. The average production life of the project wells is expected to be 10 to 20 years with final reclamation to be completed 2 to 3 years after plugging of the wells. Components of the proposed projects are listed in Chapter 2, Table 2.5-1.

#### Agreements

Surface Damage and Water Well Mitigation Agreements would be managed in the same manner as described in Alternative B.

#### Drilling

Drilling operations would be managed in the same manner as described in Alternative B.

#### Access

Access would be managed in the same manner as described in Alternative B.

#### Well Sites

Well sites would be managed in the same manner as described in Alternative B.

#### Power Lines

Power lines would be managed in the same manner as described in Alternative B.

#### Flowlines

Flowlines would be managed in the same manner as described in Alternative B.

#### Produced Water Management

Produced water management, including beneficial use and untreated and treated discharge to the Tongue River, would be managed in the same manner as described in Alternative B, except that residual brine from the treatment of water from Federal wells will not be discharged into an on-site lined pit for solidification unless a separate Sundry Notice is submitted to, and approved by, the BLM.

#### Battery/Compressor Sites

The Battery/Compressor Sites would be managed in the same manner as described in Alternative B.

#### Reclamation

Reclamation would be managed in the same manner as described in Alternatives B.

#### Field Inspections

The Deer Creek North PODs were modified as a result of the interdisciplinary review and field visits. During field “on-site” visits, each of the proposed federal locations and areas of proposed surface disturbance were inspected to ensure that potential impacts to natural resources would be minimized. The specific changes identified for these areas were as follows:

- Corridor and access to locations 31-1291, 24-0291, 11-1191, 12-0591, 43-1091, 33-1591 was rerouted to mitigate cultural concerns, surface owner and resource concerns.
- Overhead power to location 42-0591 was converted to underground
- Overhead power to location 44-1191 was relocated
- Leafy spurge was identified on locations 41-1191, 11-1191, 24-1591 requiring treatment strategies and management.
- Canada Thistle was identified on location 33-1591 requiring treatment strategies and management.

#### Additional Mitigating Measures

The following additional mitigating measures are part of Alternative C and would be included as Conditions of Approval with approved permits (see Appendix G & H for the entire Alternative C, Additional Mitigating Measures). These mitigating measures would apply to the federal wells, facilities associated with federal leases, and facilities completed for the development and production of federal wells. As a result of inspections or monitoring, BLM can impose necessary mitigation measures not previously identified or rescind mitigation measures that are not necessary.

1. The operator is responsible for informing all persons in the area who are associated with this project that they will be subject to prosecution for knowingly disturbing historic or archaeological sites, or for collecting artifacts. If historic or archaeological materials are uncovered during construction, the operator is to immediately stop work that might further disturb such materials, and contact the authorized officer (AO). Within five working days, the AO will inform the operator as to:
  - whether the materials appear eligible for the National Register of Historic Places;
  - the mitigation measures the operator will likely have to undertake before the site can be used (assuming in situ preservation is not necessary);
  - a timeframe for the AO to complete an expedited review under 36 CFR 800.11 to confirm, through the State Historic Preservation Officer, that the findings of the AO are correct and that mitigation is appropriate; and,
  - consult with affected Tribes as appropriate

If the operator wishes, at any time, to relocate activities to avoid the expense of mitigation and/or the delays associated with this process, the AO will assume responsibility for whatever recordation and stabilization of the exposed materials may be required. Otherwise, the operator will be responsible for mitigation costs. The AO will provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the AO that the required mitigation has been completed, the operator will then be allowed to resume construction.

2. Timing restriction for grouse - Surface use is prohibited from March 1 to June 15 in grouse nesting habitat within 2 miles of a lek. This lease stipulation does not apply to the operation and maintenance of production facilities. Those wells that timing would apply, unless BLM grants an exception, modification or waiver (as defined in the FEIS Wildlife Monitoring and Protection Plan), include:
  - Timing restriction would **apply for all wells except** 44-1191, 41-1491, 22-1191, 11-1191, 24-0291, and 43-1091.
3. Timing restriction for crucial mule deer winter range - Surface use is prohibited from December 1 to March 31 with crucial winter range for wildlife. This lease stipulation does not apply to the operation and maintenance of production facilities. Those wells that timing would apply, unless BLM grants an exception, modification or waiver (as defined in the FEIS Wildlife Monitoring and Protection Plan), include:
  - Timing restriction would **apply for all wells except** 11-0191, 31-0191, 31-1291, 21-0191, 11-0691, 31-0691, 22-0691, and 42-0691.



4. Timing restriction for raptor nests - Surface use is prohibited from March 1 to August 1 within 1/2 mile of raptor nest sites which have been active within the past 2 years. This lease stipulation does not apply to the operation and maintenance of production facilities. Those wells that timing would apply, unless BLM grants an exception, modification or waiver (as defined in the FEIS Wildlife Monitoring and Protection Plan), include:
  - 22-0691, 11-0691, 31-0691, 43-1091, 22-1191, 31-1291, 11-1191, 24-0291, 31-0191, 21-0191, 44-1591, 42-2291, 24-1591, 23-1591, and 22-1591.
5. Prior to stock water tank installation on BLM administered surface, a “Cooperative Agreement for Range Improvements” listing Fidelity, the surface permittee, and the BLM as a cooperator must be obtained from the BLM’s Miles City Field Office.
6. Location #22-0691: Apply appropriate erosion control, as specified in the BLM 4<sup>th</sup> edition “Gold Book”, below the road on the ephemeral drainage.
7. Location #43-1091: Apply appropriate erosion control, as specified in the BLM 4<sup>th</sup> edition “Gold Book”, on the road and pipeline routes.
8. Location #12-0591: Install an appropriately sized culvert, minimum 18”.
9. Location #31-0591: Install rock, low-water crossings in the ephemeral drainages, while also rocking the head-cut below the access route.
10. Leafy spurge was identified on locations 41-1191, 11-1191, 24-1591 requiring treatment strategies and management. Treatment prior to construction and undercarriage washing of construction equipment is required.
11. Canada Thistle was identified on location 33-1591 requiring treatment strategies and management. Treatment prior to construction and undercarriage washing of construction equipment is required.
12. In order to ensure compliance with Onshore Order #7, the following mitigating measures would apply:
  - The operator will comply with the groundwater monitoring plan requirements for lined impoundments established by the MDEQ in the MPDES permits.
  - Water from federal wells will not be discharged to surface waters unless a valid MPDES permit is in place for that discharge.
  - Residual brine resulting from the treatment of water from Federal wells will be managed by injection into permitted Class I injection wells unless a Sundry Notice is submitted to, and approved by, the BLM.

A detailed description of design features, construction practices, water management strategies and reclamation measures associated with Alternative C, can be found in the Master Surface Use Plan, Drilling Plan and Water Management Plan in the Deer Creek North and Deer Creek North Amendment PODs and their individual APDs.

## 2.3 CUMULATIVE ACTIONS

The MT FEIS analyzed long-term cumulative effects of CBNG activity throughout the region and disclosed the general types of effects to be considered in more detail during the review of site-specific CBNG proposals, such as the Fidelity’s Deer Creek North PODs. Cumulative effects are the result of impacts from other past, present, or reasonably foreseeable future actions that would overlap in time and locale with the direct effects of the proposed action or alternatives, thus resulting in “cumulative effects” distinctly different (greater or less) than the direct effects. The actions listed below have been considered as potential contributors (relevant) to cumulative effects with the proposed project. A specific cumulative effects analysis for each resource is presented in Chapter 4 by alternative.

### **2.3.1 Relevant Past and Present Actions**

#### **Tongue River Reservoir**

The Tongue River Reservoir, located within a few miles of the project area, was constructed between 1937 and 1940, modified in 1999, and is approximately 79,000 acre feet in size. The reservoir is about 12 miles long and one mile wide, with an average depth of 20 feet; covering around 3,600 acres. The Tongue River Reservoir is a major recreation site for fishing and boating in Southeast Montana; however the reservoir serves as flood protection and irrigation storage. The impact of the Tongue River Reservoir, as well as its location in proximity to the Deer Creek North PODs, may cause cumulative effects to social/economic, wildlife, ground and surface water, cultural, recreation/visuals, and aquatic resources. See Chapter 4, Environmental Consequences, for cumulative effects relating to each resource.

#### **Coal Mines**

The Decker Mine is a surface coal mine owned jointly by the Kiewit Company and Kennecott Energy Company and operated by Decker Coal Company, a Kiewit subsidiary. The East Decker Mine is located immediately west of the Deer Creek North project area and the Decker West Mine is located across the Tongue River. The mining method consists of open pit strip mining. Overburden and interburden are removed by draglines, shovels and trucks, front-end loaders and trucks or dozers. The permitted mine operations area is approximately 11,400 surface acres. The average annual coal production is 10 million short tons. The activities of the Decker Coal Mine, as well as its location in proximity to the POD project area, may cause cumulative effects to social/economics, aquatics, wildlife, surface and ground water, recreation/visuals, oil and gas, cultural, coal, and air resources. See Chapter 4, Environmental Consequences, for cumulative effects relating to each resource.

The Spring Creek Mine is a surface coal mine owned and operated by Spring Creek Coal Company. The mine is located directly north of the Decker West Mine. The mining method consists of open pit strip mining. Overburden and interburden are removed by draglines, shovels and trucks, front-end loaders and trucks or dozers. The permitted mine operations area is approximately 7,000 surface acres. The average annual coal production is 11 million short tons. The activities of the Spring Creek Mine, as well as its location in proximity to the POD project area, may cause cumulative effects to social/economics, wildlife, oil and gas, coal, recreation/visuals, cultural and air resources. See Chapter 4, Environmental Consequences, for cumulative effects relating to each resource.

#### **Railroad**

The Decker area railroad line was constructed to support the coal shipping activities of the Decker and Spring Creek Coal mines. The rail line runs from the Spring Creek Coal mine south until it intersects the main rail line located in Sheridan, Wyoming. The rail line is located within a few miles of the Deer Creek North project boundary. The Spring Creek Coal Mine has approximately 7 miles of the rail line within their mine permit boundary. Spring Creek ships around 11 million tons of coal per year, on approximately three trains a day or 1,000 per year. The Decker Coal Mine has 7.9 miles of rail within the permit boundary on two rail line loops. Decker ships around 5 million tons of coal per year, on approximately 450 to 500 trains a year. Additionally, there are 2.5 miles of rail not incorporated into either of the coal mine permit boundaries; bring the approximate total of rail in the area to 17.5 miles. The activities of the Decker area railroad, as well as its location in proximity to the POD project area, may cause cumulative effects to social/economics, wildlife, weeds, cultural and air resources. See Chapter 4, Environmental Consequences, for cumulative effects relating to each resource.

#### **CBNG Development**

**Montana:** According to BLM's Miles City Field Office and the MBOGC records and websites, on June 9, 2008, approximately 1,611 CBNG wells have been drilled in Montana. Status of these wells includes drilling, shut-in, producing and plugged/abandoned. Currently 856 CBNG wells in Montana are considered to be on production. This development is found near the Decker, Montana area; primarily in the Tongue River and Hanging Woman drainages.

At this time, Montana's approved/producing CBNG wells are operated by Fidelity Exploration & Production Company and Pinnacle Gas Resources, Inc. These wells are located either in the CX Field,

operated by Fidelity, adjacent to the CX Field or near the Hanging Woman drainage, operated by Pinnacle. CBNG projects (PODs) in Montana include the Tongue River, Badger Hills & Amendment Fee/State, Dry Creek, Fidelity Coal Creek & Amendment Fee/State, Pinnacle Coal Creek Field, Deer Creek North & Amendment Fee/State, Pond Creek Fee/State, East Decker Mine Fee/State, Dietz Fee/State, Forks Ranch Fee/State, Pinnacle Deer Creek Fee, Castle Rock-Stevens Fee/State, Hellers Peak Fee/State, and Waddle Creek Fee/State. The CBNG wells are completed in the Smith, Dietz 1, Dietz 2, Dietz 3, Monarch, Carney, Wall and Flowers-Goodale coal seams; either as a single well per coal seam or commingled with several coal seams. The activities of the CBNG development and its location in proximity to the Deer Creek North project area may cause potential cumulative effects to social/economic, wildlife, ground and surface water, air, cultural, weeds, recreation/visuals, coal, oil and gas and aquatic resources. See Chapter 4, Environmental Consequences, for cumulative effects relating to each resource.

Wyoming: According to the BLM's Buffalo Field Office and the WOGCC website, on June 9, 2008, approximately 3,089 CBNG wells are producing in Wyoming's Upper Tongue River Basin. Wyoming's CBNG well's, used for this analysis, were derived from the following Townships: T. 57 N., R. 78-85 W. & T. 58 N., R. 78-85 W. The Wyoming CBNG development and production, in proximity to the Deer Creek North project area may cause potential cumulative effects to social/economic, wildlife, ground and surface water, air, cultural, weeds, oil and gas and aquatic resources. See Chapter 4, Environmental Consequences, for cumulative effects relating to each resource.

#### Livestock Grazing

Throughout the Deer Creek North project area and the overall Tongue River drainage, over 100 years of livestock grazing has had a fundamental effect on rangeland and riparian ecology. Large herds of cattle, horses and sheep have historically trailed through the area and grazed season-long. Ecological effects have occurred through overgrazing along riparian areas, sensitive upland habitats and key wildlife areas. Recent effects have occurred through fencing and the establishment of pasture rotations, as well as livestock water developments permitting grazing in areas typically too arid for livestock use. Livestock grazing in proximity to the Deer Creek North project area may cause potential cumulative effects to social/economic, wildlife, surface water, cultural, weeds, soils, vegetation and aquatic resources. See Chapter 4, Environmental Consequences, for cumulative effects relating to each resource.

### **2.3.2 Reasonably Foreseeable Future Actions**

The BLM 1985 Powder River RMP/EIS as amended by the MT FEIS contains Reasonably Foreseeable Development and Reasonable Foreseeable Future Actions scenarios. The scenarios prepared for the amendment estimated that approximately 26,000 federal CBNG wells would be drilled throughout the life of the plan (page MIN-29). The 34 proposed wells analyzed in this document are part of the 26,000 wells predicted in the MT FEIS. Additionally, the MT FEIS predicts that an additional 200 conventional oil and gas wells would be drilled in Big Horn County in the next 20 years.

Future CBNG drill sites would most likely be in proximity to established production, or would offset dry holes to improve interpretation of structural geology. Additional wells could be drilled and produced within the Montana and Wyoming's portions of the Powder River Basin. At this time, the following PODs in Montana and Wyoming have been proposed or are close to submission and would be considered relevant in a cumulative effects analysis:

Montana (entire State) - Badger Hills Amendment Federal, Coal Creek Amendment Federal, Black Eagle Butte Fee/State, East Decker Mine Federal, Corral Creek, Pond Creek Federal, Forks Ranch Federal

Wyoming (T. 57 N., R. 78-85 W. & T. 58 N., R. 78-85 W.) - Quarter Circle 9 Beta, Water Gap, Peterson Ext., Badger Creek Add, Cabin Creek phase IV, Cabin Creek phase V, Dow 2, Sales 14, Cabin Creek phase VIII, Cabin Creek phase VI.

These PODs would account for approximately 160 APD's in Montana and 400 APD's in Wyoming. The Montana and Wyoming CBNG expansion and the location in proximity to the Deer Creek North project area may cause potential cumulative effects to social/economic, wildlife, ground and surface water, air,

cultural, weeds, recreation/visuals, coal, oil and gas and aquatic resources. See Chapter 4, Environmental Consequences, for cumulative effects relating to each resource.

It is also reasonably foreseeable that some wells would be plugged and abandoned, and that associated sites would be reclaimed. Based on the predicted 10 percent ratio of future well abandonment to future drilling, (MT FEIS page MIN-29), three of the proposed Fidelity Deer Creek North wells would be dry holes within 20 years, and would count toward the total of 2,600 anticipated dry holes Montana-wide over the same time period.

#### **2.3.2-1 Future rate of CBNG drilling**

<b><u>RFD/RFFA area</u></b>	<b><u>Number of wells predicted in the next 20 years</u></b>	<b><u>Number of wells drilled to date</u></b>
Statewide	26,000 wells	1611
County (BH, RB) area*	3,500-9,800 wells	1443

\*BH = Big Horn, RB = Rosebud

#### **Spring Creek Coal Mine Expansion**

On March 7, 2005, the BLM received an application to lease the Federal coal adjacent to the Spring Creek Coal Company (SCC) mine. This expansion project is located between the West Decker and Spring Creek Mines. The tracts, which herein will be referred to as the Lease by Application (LBA) tracts, was assigned case number MTM94378. The LBA tract includes approximately 1207.5 acres with an estimated 151.3 million tons of in-place coal and an estimated 121.4 million tons of recoverable Federal coal. The Spring Creek Coal Mine Expansion and its location in proximity to the Deer Creek North project area may cause potential cumulative effects to social/economics, wildlife, recreation/visuals, oil and gas, coal, cultural and air resources. See Chapter 4, Environmental Consequences, for cumulative effects relating to each resource.

#### **Tongue River Railroad**

On October 9, 2007, the Surface Transportation Board issued a decision regarding the Final Supplemental Environmental Impact Statement for the Tongue River Railroad Company's (TRRC) to allow rail line construction and operation in Rosebud and Big Horn Counties, Montana. The document analyzed the 17.3 mile "Western Alignment" route, which had been preceded by two related applications that were considered and approved by the Board in 1986 and 1996, respectively. The Western Alignment is an alternative route for the southernmost portion of the 41-mile Ashland to Decker alignment; known as the Four Mile Creek Alternative. The Western Alignment bypasses the Four Mile Creek alignment, which is generally located from the Birney Road (Hwy 566) and the Tongue River Canyon junction, running west to Hwy 314, then south to the Decker Mine. The Western Alignment would continue south along the Tongue River on the ridge, but paralleling the river and ending around the Spring Creek Mine area. At this time, no construction operations have begun. The Deer Creek North project area is within approximately 5 miles of the southern sections on the proposed TRRC Four Mile Creek and Western Alignment routes. The Tongue River Railroad approved Western Alignment route and its location in proximity to the Deer Creek North project area may cause cumulative effects to social/economic, wildlife, surface water, air, cultural, recreation/visuals, weeds and aquatic resources. See Chapter 4, Environmental Consequences, for cumulative effects relating to each resource.

#### **2.3.3 Potential Future Actions**

The following potential future actions are too vague to be considered in this document's cumulative effects analysis. These actions will not escape a NEPA analysis; rather when they are proposed or known by the BLM, then they will be considered in a cumulative effects analysis. This would include the following actions:

- Wolf Mountain Coal, Inc.
- St. Mary's CBNG PODs/APDs
- Otter Creek Coal Tract Development
- Fidelity Exploration and Development CBNG PODs/APDs
- Pinnacle Gas Resources, Inc., CBNG PODs/APDs

- Crow Tribe CBNG Mineral Development
- Montana & Wyoming CBNG PODs currently not proposed
- Young's Creek, CX, and Ash Creek Coal Mines

## **2.4 PREFERRED ALTERNATIVE IDENTIFICATION**

The BLM has identified *Alternative C—Fidelity's Proposed Action; Deer Creek North and Deer Creek Amendment PODs, Federal Well & Infrastructure Development and Existing Water Management Options, with Additional Mitigation*, as its Preferred Alternative.

## **2.5 COMPARISON OF ALTERNATIVES**

Table 2.5-1 compares the major components of the three alternatives. Table 2.5-2 compares the major effects identified in Chapter 4 from each of the alternatives.

**Table 2.5-1 Fidelity Deer Creek North Project Area - Comparison of Alternatives**

<b>Project Component</b>	<b>Alternative A No Action</b>	<b>Alternative B Proposed Action</b>	<b>Alternative C Preferred Alternative</b>
	No approvals would be issued for the PODs, the existing situation would continue and no federal wells or associated infrastructure would be constructed. The PODs proposed by Fidelity would be denied in their entirety and the landscape would not be further altered.	Fidelity's Proposed Action implementation; including Deer Creek North and Deer Creek Amendment PODs, Federal Well & Infrastructure Development and Existing Water Management Options	Fidelity's Proposed Action implementation; including Deer Creek North and Deer Creek Amendment PODs, Federal Well & Infrastructure Development and Existing Water Management Options, with Mitigating measures not already part of the operator's proposal.
<b>Well Drilling Activities:</b>			
Number and land status of CBNG wells in the Deer Creek North Project Area	No approval would be received for any of the 34 proposed applications to drill.	<ul style="list-style-type: none"> <li>34 new federal wells on 34 locations, 10.2 acres</li> </ul>	Same as Alternative B.
Drilling Actions	No drilling actions.	<ul style="list-style-type: none"> <li>34 federal CBNG wells drilled to depths of 500 feet to 1,300 feet</li> <li>A single vertical well would be drilled into the Wall, Carney, Monarch and Dietz coal seams</li> <li>Air and/or fresh water (including coal seam water) used in drilling</li> <li>Steel casing cemented from ground surface to the top of the lowest coal seam</li> <li>Anticipated drilling period of 3 days per well</li> </ul>	Same as Alternative B.

<b>Project Component</b>	<b>Alternative A No Action</b>	<b>Alternative B Proposed Action</b>	<b>Alternative C Preferred Alternative</b>
Disposal of wastes	No waste would be generated	<ul style="list-style-type: none"> <li>• 34 federal CBNG wells at 34 locations with a 15'L x 6'W x 15'D feet reserve pit</li> <li>• Reserve pits fenced</li> <li>• Fluids in the pits removed and/or used for well drilling</li> <li>• Wastes contained onsite and disposed of at the Sheridan landfill</li> <li>• Chemical "porta-potties" used</li> </ul>	Same as Alternative B.
<b><i>Production Support Facilities:</i></b>			
Field Battery Sites and Sales Battery Site (compressor sites)	No new construction  Existing Batteries: <ul style="list-style-type: none"> <li>• Deer Creek Central – Holmes 14 Complex, Montana Royalty #3 Battery, Holmes 2 Battery, Decker #6 Battery</li> </ul> 1 Existing Sales Battery: <ul style="list-style-type: none"> <li>• Symons Central Compressor Station</li> </ul>	Existing Batteries: <ul style="list-style-type: none"> <li>• Deer Creek Central – Holmes 14 Complex, Montana Royalty #3 Battery, Holmes 2 Battery, Decker #6 Battery</li> </ul> 1 Existing Sales Battery: <ul style="list-style-type: none"> <li>• Symons Central Compressor Station</li> </ul>	Same as Alternative B.
Gas & Water Pipelines	No new construction	<ul style="list-style-type: none"> <li>• 11.1 miles flowline (.4 miles federal surface, 10.7 miles private surface)</li> <li>• No flowline is outside the common corridor</li> </ul>	Same as Alternative B.

Electric Lines	No new construction	<ul style="list-style-type: none"> <li>• 1.3 miles new overhead (all private surface outside corridors)</li> <li>• 5 power drops</li> <li>• 13 miles existing overhead (all private surface)</li> <li>• 11 miles of underground (.4 miles federal surface; 10.7 miles private surface)</li> <li>• No underground powerline is outside the common corridor</li> </ul>	Same as Alternative B.
<b>Access:</b>			
Road construction and use	Road use would reflect the current situation	<ul style="list-style-type: none"> <li>• Existing two-track: 4.5 miles (all private surface)</li> <li>• Proposed two-track: 11.3 miles (.4 fed., 10.9 pvt. surface)</li> <li>• Existing improved road/spot upgrades: 4.5 miles (all private surface)</li> <li>• Proposed improved road/spot upgrades: .1 miles (all private surface)</li> <li>• 1 – low water crossing</li> </ul>	Same as Alternative B.
<b>Produced Water Management:</b>			
Maximum discharge of untreated water to the Tongue River via MPDES Permit # MT-0030457 (1,600-2,500 gpm permitted)	1,482 gpm	2,372 gpm	Same as Alternative B.
Maximum discharge of treated water to the Tongue River via MPDES Permit # MT-0030724 (1,700 gpm permitted)	1,430 gpm	1,700 gpm	Same as Alternative B.
Additional Approved and/or Existing Water Management Options	<ul style="list-style-type: none"> <li>• Beneficial use in the Spring Creek and Decker Coal Mines</li> <li>• Beneficial use for CBNG drilling, construction, and dust suppression</li> <li>• Beneficial use by livestock and wildlife</li> </ul>	Same as Alternative A.	Same as Alternative A.



<b>Reclamation:</b>			
Reclamation Measures	No action would require no reclamation.	<ul style="list-style-type: none"> <li>Reclamation activities conducted in accordance with the surface owner agreements, the BLM specifications, MDEQ storm water construction permits and storm water pollution prevention plans</li> <li>Disturbed areas seeded with a certified seed mix agreed to by the BLM and/or the surface owner</li> </ul>	Same as Alternative B.
Reclamation Timeframes	No action would require reclamation.	<ul style="list-style-type: none"> <li>Reclamation in areas where surface disturbing activities have been completed or completed concurrently while other operations are occurring in the project area</li> <li>Reclamation within 1 year after a specific activity has been completed</li> <li>Seeding in the fall of each year, after September 15, however, if spring seeding is selected will be completed by May 15</li> <li>Final reclamation completed approximately 2 to 3 years following the end of gas production</li> </ul>	Same as Alternative B.
<b>Monitoring Plans:</b>			
Air Quality	None required	Per MDEQ requirements for testing to demonstrate compliance with emission limits and Annual Emission Inventories	Same as Alternative B.
Wildlife	None required	Implementation of the Wildlife Monitoring and Mitigation Plan	Same as Alternative B.

<b>Reclamation:</b>			
Soils	None required	Sites would be monitored during various stages of development and reclamation to ensure erosion and impacts are limited	Same as Alternative B.
Noxious Weeds	None required	Implementation of the Noxious Weed Control Plan	<ul style="list-style-type: none"> <li>• Same as Alternative B.</li> <li>• Sites will be monitored for weed infestations within the project area, reported and treated once identified</li> <li>• Wash stations will be set up and used by all equipment entering and leaving infestation areas</li> </ul>
Water Quality	Per MDEQ MPDES requirements	Same as Alternative A.	Same as Alternative A.

**Table 2.5-2 Fidelity Deer Creek North Project Area - Summary Comparison of Effects**

<b>Affected Resource &amp; Effect Indicators</b>	<b>Existing Resource Conditions</b>	<b>Alternative A No Action</b>	<b>Alternative B Proposed Action</b>	<b>Alternative C Preferred Alternative</b>
<b><i>Air Quality:</i></b>				
Pollutant concentrations	<p>The area of the proposed project is currently classified as attainment/unclassified for the National Ambient Air Quality Standards (NAAQS). Therefore, the area is considered to be in compliance with ambient air quality standards.</p> <p>Existing criteria pollutant concentrations are in compliance with MAAQS and NAAQS, except for one violation of the 24 hour PM10 MAAQS in 2003 near Lame Deer in Rosebud County, Montana.</p>	<p>Resource conditions would remain the same because no emissions sources would be added.</p> <p>Concentrations of NO<sub>2</sub>, CO, SO<sub>2</sub> and PM<sub>10</sub> in compliance with MAAQS and NAAQS.</p> <p>Concentrations of NO<sub>2</sub> in compliance with PSD Class I at the Northern Cheyenne Reservation and in adjacent PSD Class II areas.</p>	<p>Same as Alternative A except, with Alternative B the highest pollutant emitted from drilling activities would be TSP (43.48 tons per year).</p> <p>The highest emissions from production would be from NO<sub>x</sub> and CO (392.28 and 564.11 tons per year).</p> <p>Actual emissions from the project would be below the MAQP threshold, because (1) controlled emissions from Alternative B would exhibit good dispersion characteristics; (2) emissions would not exceed MDEQ permit thresholds; and (3) emissions would be temporary in nature.</p> <p>MDEQ determined that controlled emissions from the source would not cause or contribute to a violation of any ambient air quality standard.</p> <p>Refer to emission inventory tables and modeling analysis tables contained in Section 4.2.1.</p>	Same as Alternative B.
Visibility	Visibility monitoring data limited for Northern	Visibility in compliance with thresholds for	Same as Alternative A.	Same as Alternative A.

	<p>Cheyenne Reservation (2003 &amp; 2004) and North Absaroka Wilderness (2002-2004).</p> <p>Recent visibility monitoring data for Yellowstone National Park show no worsening trend.</p>	mandatory federal Class I areas. Potential exceedances of voluntary visibility threshold at other sensitive locations from cumulative sources.		
Atmospheric Deposition	Existing atmospheric deposition monitoring at Little Big Horn Battlefield National Monument shows precipitation pH values are normal.	Atmospheric deposition in compliance with voluntary lake chemistry threshold in sensitive lakes.	Same as Alternative A.	Same as Alternative A.
<b><i>Cultural Resources:</i></b>				
National Register listed or eligible sites	<p>No sites listed on the National Register within either POD boundary.</p> <p>A total of 43 cultural resources recorded in the Deer Creek North POD. 24 prehistoric sites, 17 historic sites, and 2 with historic and prehistoric components.</p> <p>10 prehistoric sites require further work to evaluate eligibility, others not eligible. 2 Historic Sites Eligible. 1 impacted.</p>	No direct impacts to cultural resources if PODs not developed.	Impact on six sites, one eligible site in Deer Creek North POD.	Same as Alternative B except unanticipated discoveries of cultural materials to the federal wells and infrastructure would be dealt with by a BLM cultural mitigation measure applied as a Condition of Approval
Areas of traditional cultural value	No specific areas identified within Deer Creek North project of concern by Northern Cheyenne THPO	No impacts since no developments are proposed	No specific areas identified by Northern Cheyenne THPO	Same as Alternative B, the BLM Cultural mitigation measure applied as a Condition of Approval

<b><i>Geology and Minerals:</i></b>				
CBNG Development	CBNG Production	No CBNG would be produced	110 BCF of CBNG would be produced from the 150 existing fee and state wells and the proposed 34 Federal wells	Same as Alternative B.
	Methane Migration	No additional methane migration	Wells/springs in coals could experience gas influx	Same as Alternative B.
	Methane Drainage	No additional drainage situations – no present drainage cases resolved	Some present drainage cases resolved by drilling	Same as Alternative B.
Coal Resources	Coal will continue to be mined	Coal mine and CBNG development conflicts would not occur	<ul style="list-style-type: none"> <li>Development conflicts between coal mines and CBNG development could occur</li> <li>Final phase IV release of State coal mine bond could be problematic due to overlapping effects to groundwater from coal mining and CBNG development and impacts to mines groundwater monitoring systems</li> </ul>	Same as alternative B.
<b><i>Hydrology:</i></b>				
<b><i>Surface Water Impacts</i></b>				
Maximum Flow during Winter LMM at Birney Day School (time of greatest discharge)	173 cfs  Estimated flows are 4.1% above historical levels.	Same as Existing	175 cfs  Estimated flows would be 5.4% above historical levels and 1.3% over No Action.	Same as Alternative B.
Historical = 166 cfs	The Tongue River has been listed as impaired due to flow alterations (reductions). These small increases would be unlikely to substantially improve conditions; however, these increases would not lead to further impairment of beneficial uses.			

Maximum Flow during Winter 7Q10 at Birney Day School (time of greatest discharge)  Historical = 74 cfs	81 cfs  Estimated flows are 9.1% above historical levels.	Same as Existing	83  Estimated flows would be 12.1% above historical levels and 2.7% over No Action.	Same as Alternative B.
	The Tongue River has been listed as impaired due to flow alterations (reductions). These small increases would be unlikely to substantially improve conditions; however, these increases would not lead to further impairment of beneficial uses.			
Maximum SAR during Winter LMM at Birney Day School (time nearest a standard)  Historical = 1.05  Mean Monthly Standards: MDEQ Std = 5 N. Ch. Std = 2	1.30 (SAR is unitless)  Estimated SAR values are 22.9% above historical levels.	Same as Existing	1.41  Estimated SAR values would be 34.0% above historical levels and 9.0% over No Action.	Same as Alternative B.
	All estimated SAR values are below the applicable standards. SAR levels would not impair beneficial uses. Monitoring has not shown increases in SAR as great as projected for existing, indicating that the modeling approach is conservative.			
Maximum SAR during Summer 7Q10 at Birney Day School (time nearest a standard)  Historical = 1.59  Inst. Max Standards: MDEQ Std = 4.5 N. Ch. Std = 2	1.89  Estimated SAR values are 18.6% above historical levels.	Same as Existing	1.97  SAR values would be 23.6% above historical levels and 4.2% over No Action.	Same as Alternative B.
	All estimated SAR values are below the applicable standards. SAR levels would not impair beneficial uses. Monitoring has not shown increases in SAR as great as projected for existing, indicating that the modeling approach is conservative.			

Maximum EC during Spring LMM at Birney Day School (time nearest a standard)	696 uS/cm	Same as Existing	704 uS/cm	Same as Alternative B.
Historical = 674 uS/cm	Estimated EC values are 3.2% above historical levels.		EC values would be 4.4% above historical levels and 1.1% over No Action..	
Mean Monthly Standards: MDEQ Std = 1,000 uS/cm N. Ch. Std = 1,000 uS/cm	All estimated EC values are below the applicable standards. EC levels would not impair beneficial uses.			
Maximum EC during Summer 7Q10 at Birney Day School (time nearest a standard)	1,154 uS/cm	Same as Existing	1,159 uS/cm	Same as Alternative B.
Historical = 1,136 uS/cm	EC values are 1.6% above historical levels.		EC values would be 2.0% above historical levels and 0.4% over No Action.	
Inst. Max Standards: MDEQ Std = 1,500 uS/cm N. Ch. Std = 2,000 uS/cm	All estimated EC values are below the applicable standards. EC levels would not impair beneficial uses.			
<b>Groundwater Impacts</b>				
Area contained within the anticipated 20' drawdown contour	126.0 mi <sup>2</sup>	Same as Existing	126.6 mi <sup>2</sup>	Same as Alternative B.
# of Water Wells within the 20' drawdown contour	57	Same as Existing	58	Same as Alternative B.
	Only those wells that area completed in the developed coal seams would be affected by drawdown. Water mitigation agreements are anticipated to mitigate the effects of this drawdown.			
# of Springs within the 20' drawdown contour	12	Same as Existing	Same as Existing	Same as Existing
	Only those springs which receive their water from the developed coal seams would be affected by drawdown. Water mitigation agreements are anticipated to mitigate the affects of this drawdown.			

<b><i>Indian Trust and Native American Concerns:</i></b>				
Indian Trust Assets	No Indian Trust Assets present in POD boundaries	No impacts due to no development	Same as Alternative A. In addition, impacts to the concerns raised by the Northern Cheyenne Tribe would be addressed in the appropriate section of the EA. <ul style="list-style-type: none"> <li>• MAQP's protect NCT's Class I airshed values.</li> <li>• MPDES permit protects NCT's proposed water quality and standards</li> </ul>	Same as Alternative B.
<b><i>Lands and Realty:</i></b>				
Right-of-ways	No R/W's in the project area	No effects	Same as Alternative A	Same as Alternative A.
<b><i>Livestock Grazing:</i></b>				
Livestock Operations	Two livestock operations within the Deer Creek North POD area. The operations run approximately 520 cow/calf pairs. Seasons of use varies depending on each operation. Available water is somewhat limiting to these livestock operations.	No effects	Approximately 53 acres of vegetation would be removed short term, which would reduce the amount of forage available equaling about 10 Animal Unit Months (AUMs). Approximately 10 acres and 2 AUMs would be removed long term. 8 tanks holding 800-900 gallons would provide more flexibility for livestock use and distribution and replace the AUMs lost to production facilities	Same as Alternative B.
<b><i>Recreation and VRM:</i></b>				
Recreational Use	Tongue River Reservoir and hunting primary uses; public land access is limited	No Change	No change due to limited opportunity and access through private lands	Same as Alternative B.
Visual Resources	Class III Management objective	No Change	Management Class III may move toward a IV	Same as Alternative B.



<b><i>Social and Economic Conditions:</i></b>				
Federal Production	258,209 MCF	No Change	9.3 BCF	Same as Alternative B.
Federal Royalties	\$118,646	No Change	\$4,600,000	Same as Alternative B.
Environmental Justice	In 2000, 24% of Big Horn population and 17% Rosebud Counties had incomes below the poverty level; compared to a state figure of 13% and reflect the relatively large numbers of persons on the reservations living in poverty.	No Change	No Change	No Change
<b><i>Soils:</i></b>				
Approximate acres of Disturbance (before reclamation / after reclamation during production)	45 acres of disturbance from fee and State production wells	No Change	53 acres during the short term (<5 years) and approximately 10 acres during the long term (>5 years)	Same as Alternative B.
Soil disturbance and Erosion	Localized mixing of horizons and exposure of the soil to wind and water erosion. It is estimated that 128 acres were disturbed during the State and fee development and approximately 45 acres remain unreclaimed during the production	No Change	Localized horizon mixing, compaction, structure destruction, loss of nutrients, productivity reduced, and surface and subsurface flora and fauna modification; contributing to increased erosive potential.	Same as Alternative B, with additional mitigation measures of erosion control to specific locations would generally lessen the potential for topsoil displacement, exposure of soil, loss of soil productivity and increased susceptibility of the soil to wind and water erosion
<b><i>Vegetation:</i></b>				
Montana Plant Species of Concern	No known Montana Plant Species of Concern in the project area.	No changes to the existing environment.	Impacts not likely to Montana Plant Species of Concern.	Same as Alternative B.

<b>Wildlife/Aquatics:</b>				
Habitat fragmentation and disturbance in project area	Project area is currently fragmented by county roads, powerlines, numerous two-tracks trails and existing CBNG production.	No changes to the existing environment.	Increased habitat fragmentation and disturbance from 34 federal wells, 0.1 miles of new, spot upgraded two-track trails, 11.3 miles of new improved two-track trails, and other infrastructure of new two-track roads.	Same as Alternative B.
Electrocution hazard level	Existing aerial powerlines pose electrocution hazard; 13 miles of existing line.	No changes to the existing environment.	Increased electrocution hazard with 1.3 miles of additional overhead power lines and 5 power drops.	Same as Alternative B.
Aerial powerline collision hazard	Existing aerial powerlines pose collision hazard with avian species.	No changes to the existing environment.	Increased collision hazard with 1.3 miles of additional overhead power lines and 5 power drops.	Same as Alternative B.
Proximity to T&E species habitat	Potential habitat exists within this POD to support black-footed ferrets.	No changes to the existing environment.	No direct/indirect impacts to ferrets, low likelihood of black-footed ferret occupation of black-tailed prairie dog towns within the project area.	Same as Alternative B.